UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

3111112610 2

MATHEMATICS **0581/33**

Paper 3 (Core) **May/June 2012**

2 hours

Candidates answer on the Question Paper.

Additional Materials: Electronic calculator
Mathematical tables (optional)
Geometrical instruments
Tracing paper (optional)

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name on all the work you hand in.
Write in dark blue or black pen.
You may use a pencil for any diagrams or graphs.
Do not use staples, paper clips, highlighters, glue or correction fluid.
DO **NOT** WRITE IN ANY BARCODES.

Answer **all** questions.
If working is needed for any question it must be shown below that question.
Electronic calculators should be used.
If the degree of accuracy is not specified in the question, and if the answer is not exact, give the answer to three significant figures. Give answers in degrees to one decimal place.
For π, use either your calculator value or 3.142.

At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.
The total of the marks for this paper is 104.

This document consists of **16** printed pages.

UNIVERSITY of CAMBRIDGE International Examinations

1 **(a)** The minimum temperatures at Beijing Airport, for five days, are given in this table.

Day	Monday	Tuesday	Wednesday	Thursday	Friday
Temperature (°C)	–3	5	–1	2	–4

(i) Write down the lowest temperature.

Answer(a)(i) ..... °C [1]

(ii) Write these temperatures in order, starting with the lowest.

Answer(a)(ii) ..... < ..... < ..... < ..... < ..... [1]

(iii) What is the difference between the temperatures on Monday and Tuesday?

Answer(a)(iii) ..... °C [1]

(b) The table shows part of the timetable for flights from Beijing to Hong Kong.

Beijing	07 45	08 00	09 30
Hong Kong	11 20	11 40	13 05

(i) At what time does the first plane after midday arrive in Hong Kong?

Answer(b)(i) ..... [1]

(ii) How long, in hours and minutes, does the 07 45 flight from Beijing to Hong Kong take?

Answer(b)(ii) ..... h ..... min [1]

(c) A plane travels 1708 km in 3.5 hours.

Work out the average speed of the plane.
Give the units of your answer.

Answer(c) .... [2]

2 **(a)** Find all the factors of 28.

Answer(a) ..... [2]

(b) Write down a multiple of 8 that is greater than 20.

Answer(b) ..... [1]

(c) Work out 18^3.

Answer(c) ..... [1]

(d) p and q are prime numbers.

$$p^3 \times q^2 = 200$$

Find the values of p and q.

Answer(d) p = ...

q = ... [2]

(e) A town has two bus companies.
Buses from Western Travel stop at the Town Hall every 8 minutes.
Buses from Eastern Travel stop at the Town Hall every 14 minutes.

(i) Write down the lowest common multiple of 8 and 14.

Answer(e)(i) ..... [2]

(ii) A bus from each company stops at the Town Hall at 08 00.

When is the next time that a bus from each company stop together at the Town Hall?

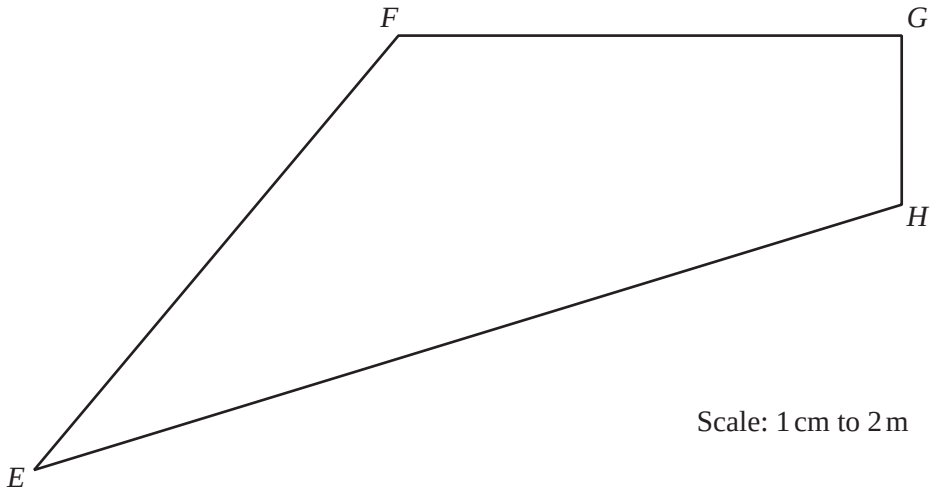
Answer(e)(ii) ..... [1]

(iii) The cost of an adult ticket on Western Travel is $\$a$ and the cost of a child's ticket is $\$c$.
One day 84 adult tickets and 36 child tickets are sold.

Write an expression, in terms of a and c, for the total cost of these tickets.

Answer(e)(iii) $ ..... [2]

3 Here is a scale drawing of a shop floor, *EFGH*.
The scale is 1 centimetre represents 2 metres.



(a) What is the mathematical name of the shape *EFGH*?

Answer(a) ..... [1]

(b) What type of angle is angle *EFG*?

Answer(b) ..... [1]

(c) Find the actual length, in metres, of the side *EH*.

Answer(c) ..... m [2]

(d) Measure angle *FEH*.

Answer(d) Angle *FEH* = ... [1]

(e) **Complete this part using ruler and compasses only.**
All construction arcs must be clearly shown.

A table is placed
- nearer to *E* than to *H*

and
- less than 14 m from *H*.

By constructing two loci on the scale drawing, find and label the region *R*, where the table is placed. [5]

(f) The shop sells shoes which are packed in boxes.
Each box is a cuboid 33.2 cm long, 16.8 cm wide and 11 cm high.

Calculate the volume of one of these shoe boxes.

Answer(f) ..... cm^3 [2]

For Examiner's Use

4 **(a)** In a café the price of an adult's meal is \$24 and the price of a child's meal is \$16. A 12% service charge is added to the costs of the meals.

Calculate the **total** cost of meals for 2 adults and 3 children.

Answer(a) \$ ..... [3]

(b) On a Saturday night the adult meal price of \$24 is increased by 20%.

Calculate the increased price of this meal.

Answer(b) \$ ..... [2]

(c) The price of a large cup of coffee increases from \$3.00 to \$3.42.

Calculate the percentage increase in the price.

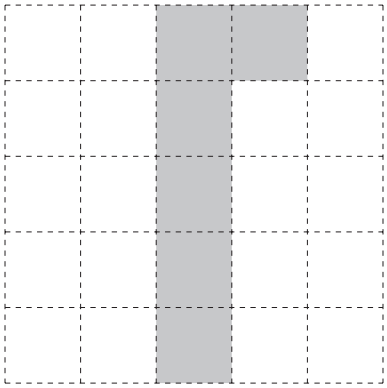
Answer(c) ..... % [3]

For Examiner's Use

5 **(a)** Draw all the lines of symmetry on this rectangle.

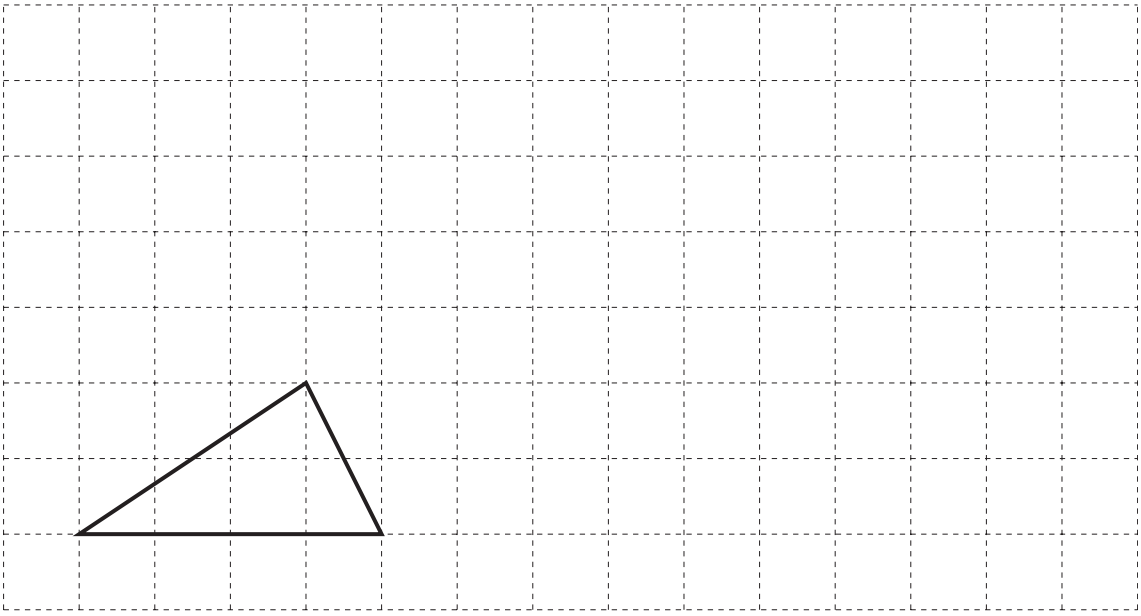
[2]

(b) Shade **one** square so that the shaded shape has rotational symmetry of order 2.



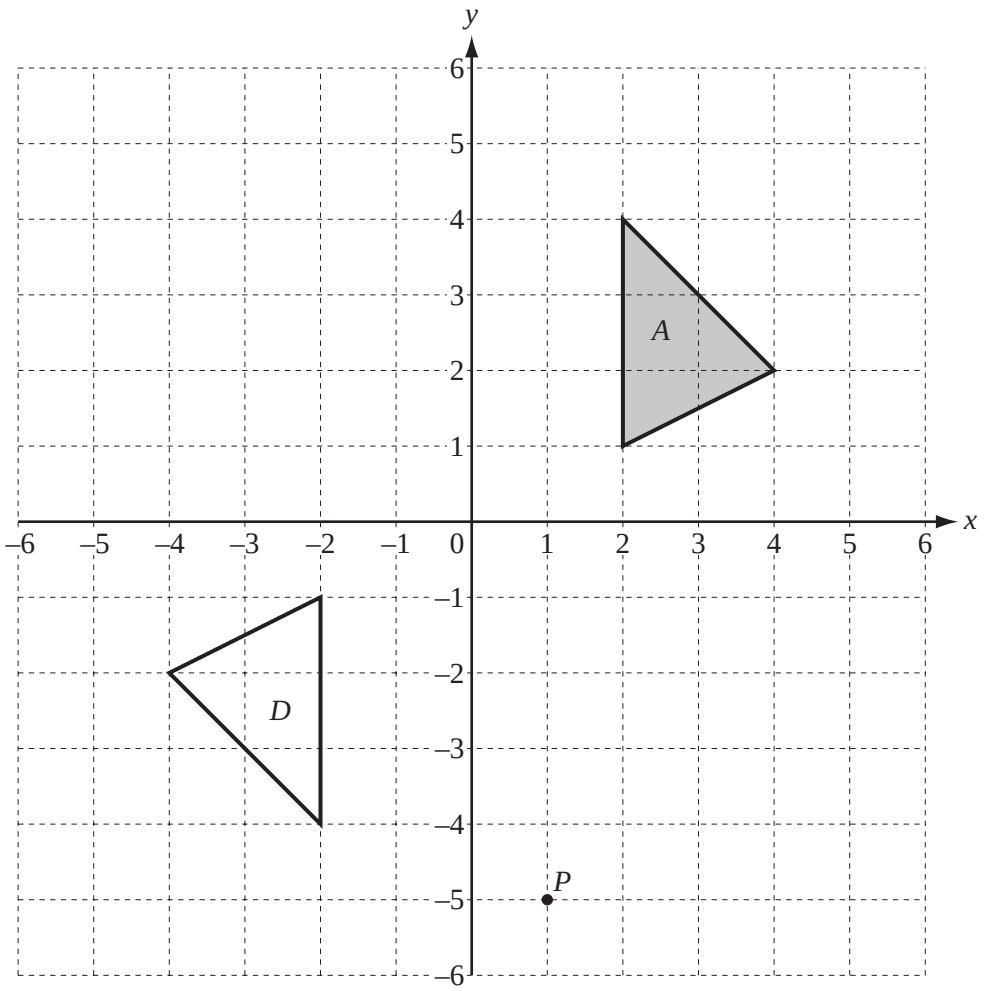
[1]

(c) On the grid below, draw an enlargement of the triangle with a scale factor of 2.



[2]

(d)



(i) Write down the co-ordinates of the point P.

Answer(d)(i) (..... , ...) [1]

(ii) Reflect triangle A in the y-axis.
Label the image B. [1]

(iii) Translate triangle A by the vector $\begin{pmatrix} 1 \\ -3 \end{pmatrix}$.

Label the image C. [2]

(iv) Describe the **single** transformation that maps triangle A onto triangle D.

Answer(d)(iv) ..... [3]

For Examiner's Use

6 James and Wei have a car.
Each year James drives 3 600 km and Wei drives 4 800 km.

(a) Write 3 600 : 4 800 as a ratio in its simplest form.

Answer(a) ..... : ..... [1]

(b) A garage charges $420 to service the car.
James and Wei share the $420 in the ratio James : Wei = 2 : 3 .

Find the amount that James pays.

Answer(b) $ ..... [2]

(c) On a 268 km journey the car uses 22.8 litres of fuel.

By writing these numbers to 1 significant figure, estimate the distance travelled using one litre of fuel.
Show all your working.

Answer(c) ..... km [2]

(d) On another journey the car uses 46.3 litres of fuel.
Fuel costs $1.48 per litre.

Work out the cost of the fuel for this journey.

Answer(d) $ ..... [2]

(e) The table shows some information about the car.

Fuel tank capacity	64 litres (to the nearest litre)
Width	1810 mm (to 3 significant figures)

(i) Write down the upper bound of the fuel tank capacity.

Answer(e)(i) ..... litres [1]

(ii) Write down the minimum width of the car.

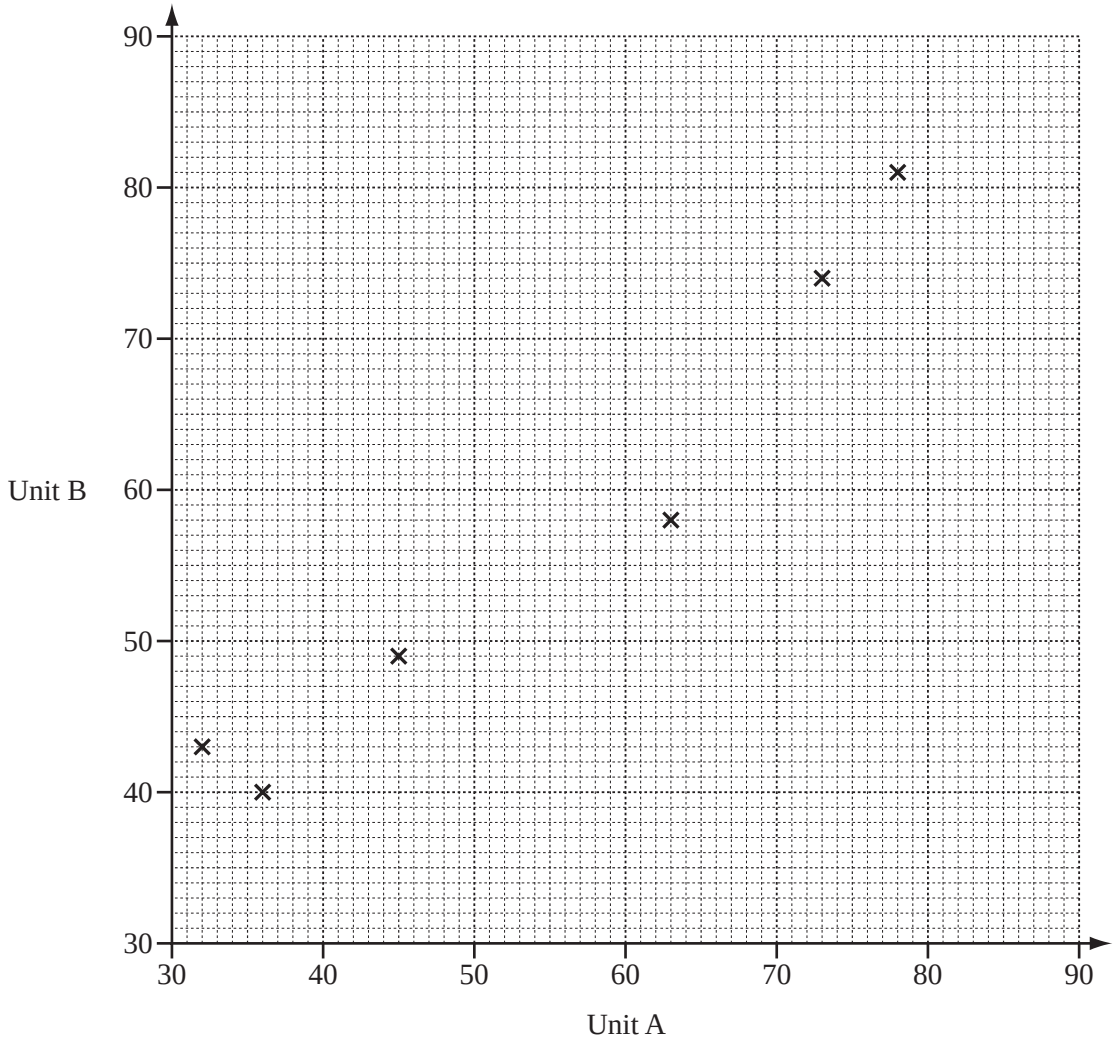
Answer(e)(ii) ..... mm [1]

For Examiner's Use

7 The table shows the marks for ten students in their Chemistry papers for Unit A and Unit B.

Unit A	32	78	45	63	36	73	58	41	68	54
Unit B	43	81	49	58	40	74	60	50	72	59

(a) On the grid, complete the scatter diagram for these results.
The first six points have been plotted for you.



[2]

(b) What type of correlation does the scatter diagram show?

Answer(b) ..... [1]

(c) (i) Calculate the mean of the marks for Unit A.

Answer(c)(i) ..... [2]

(ii) Work out the range of the marks for Unit A.

Answer(c)(ii) ..... [1]

(iii) The mean for Unit B is 58.6.

Which unit did the students find more difficult?
Give a reason for your answer.

Answer(c)(iii) Unit ..... because .....

..... [1]

(d) (i) Draw a line of best fit on the grid. [1]

(ii) Lee scored 48 on Unit A but she was absent for Unit B.

Use your line of best fit to estimate her score on Unit B.

Answer(d)(ii) ..... [1]

(e) Find how many students scored more than 65 marks on both units.

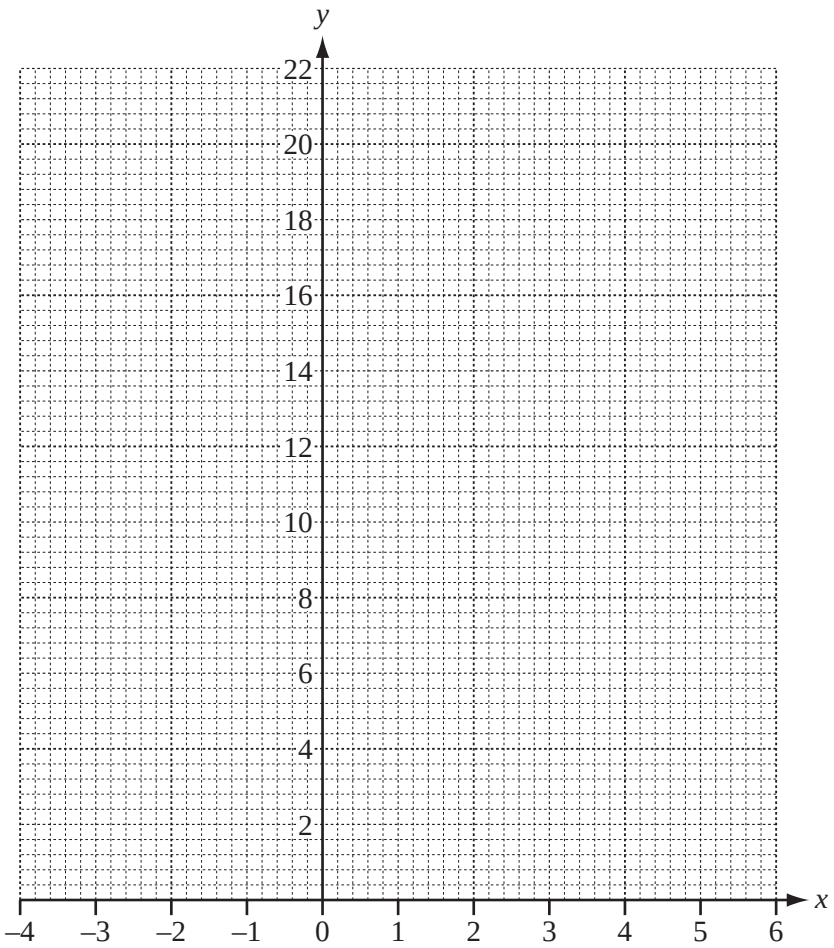
Answer(e) ..... [1]

8 **(a)** Complete the table of values for $y = x^2 - 2x + 5$.

x	–3	–2	–1	0	1	2	3	4	5
y	20		8				8		20

[3]

(b) On the grid, draw the graph of $y = x^2 - 2x + 5$ for $-3 \leqslant x \leqslant 5$.



[4]

(c) **(i)** On the grid, draw the line of symmetry of the graph. [1]

(ii) Write down the equation of the line of symmetry.

Answer(c)(ii) ..... [1]

(d) **(i)** On the grid, draw the line $y = 12$. [1]

For Examiner's Use

(ii) Use your graph to solve the equation $x^2 - 2x + 5 = 12$.

Answer(d)(ii) $x =$ ..... or $x =$ ..... [2]

(e) The equation of a straight line is $y = 6 - 3x$.

(i) Write down the gradient of this line.

Answer(e)(i) ..... [1]

(ii) Write down the co-ordinates of the point where this line crosses the y-axis.

Answer(e)(ii) (..... , ...) [1]

(iii) Write down the equation of a line parallel to $y = 6 - 3x$.

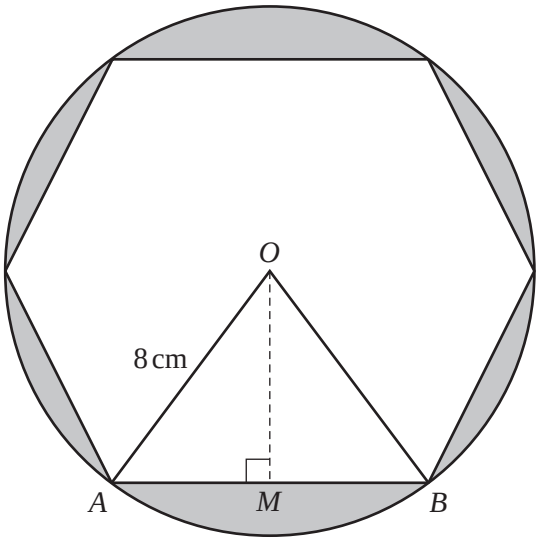
Answer(e)(iii) ..... [1]

(f) Simplify $3(2x + 1) - 2(6 - 3x)$.

Answer(f) ..... [2]

For Examiner's Use

9 The diagram shows a regular hexagon inside a circle, centre O and radius 8 cm.
Each vertex of the hexagon is on the circumference of the circle.
A and B are two vertices of the hexagon and M is the midpoint of AB.



NOT TO SCALE

(a) Calculate

(i) angle AOB,

Answer(a)(i) Angle AOB = ... [1]

(ii) angle AOM.

Answer(a)(ii) Angle AOM = ... [1]

(b) Write down the length AB.

Answer(b) AB = ... cm [1]

(c) Show that the length of $OM = 6.93$ cm, correct to 3 significant figures.

Answer(c)

[2]

(d) Calculate the area of triangle AOB.

For Examiner's Use

Answer(d) ..... cm^2 [2]

(e) Calculate the shaded area.

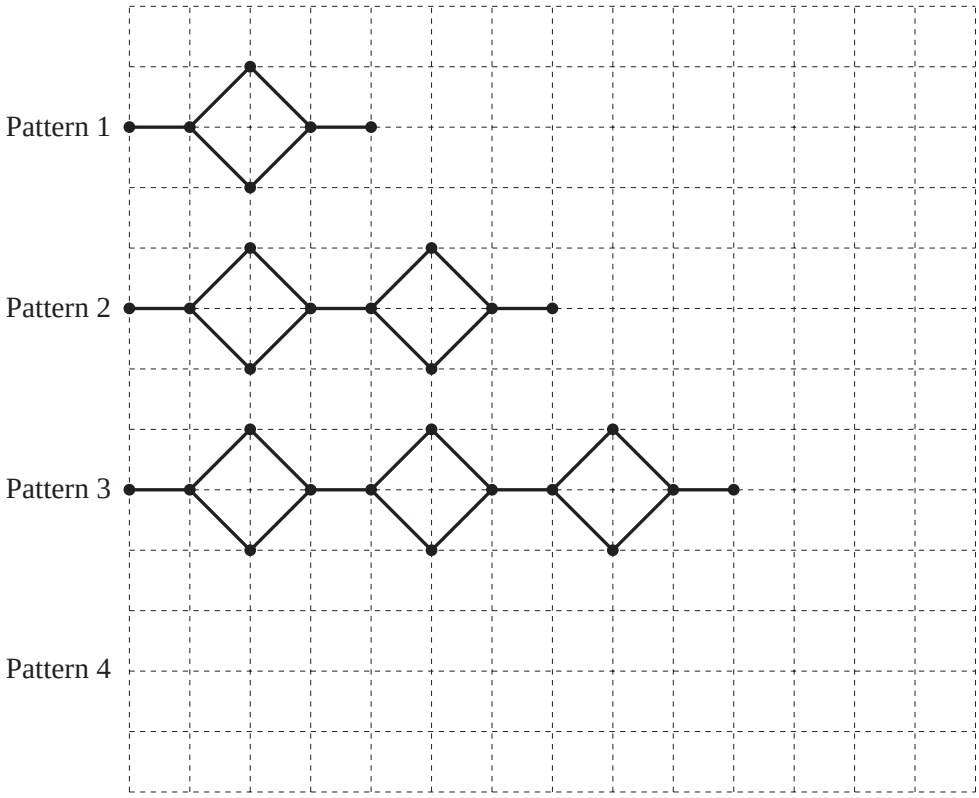
Answer(e) ..... cm^2 [4]

Question 10 is printed on the next page.

For Examiner's Use

10 The Patterns shown below form a sequence.

Pattern 1 has 6 dots and 6 lines.
Pattern 2 has 10 dots and 11 lines.



(a) On the grid, draw Pattern 4. [1]

(b) **(i)** Find the number of dots in Pattern 5.

Answer(b)(i) ..... [1]

(ii) Explain how you worked out your answer in **part (b)(i)**.

Answer(b)(ii) ..... [1]

(c) Write down an expression, in terms of n, for the number of dots in Pattern n.

Answer(c) ..... [2]

(d) The number of dots in Pattern n is 62 .

Find n.

Answer(d) n = ... [2]